

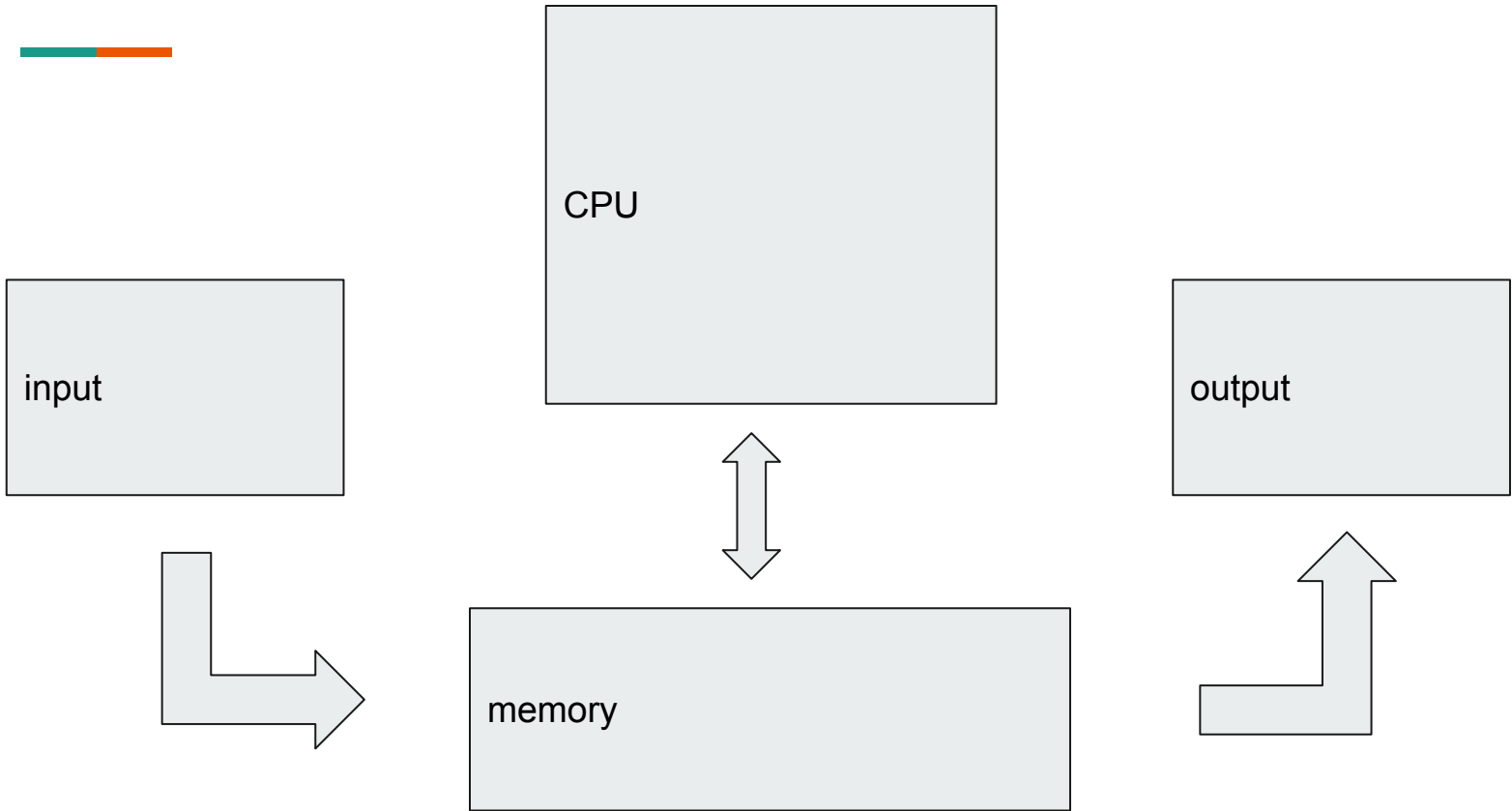


# W2 Hardware



Chia-Hsiang Chen | Dept. of MIS

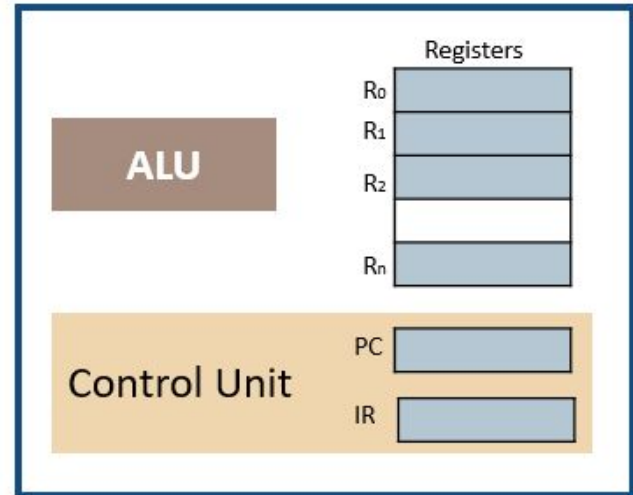
[110208061@g.nccu.edu.tw](mailto:110208061@g.nccu.edu.tw)



# CPU - in the textbook

- CPU: Central Processing Unit, interpret and carry out the basic instructions.
  - ALU: Arithmetic Logic Unit
  - CU: Control Unit
    - PC: Program Counter
    - IR: Instruction Register

memory  
(NOT in CPU)





# How to choose a CPU? Intel or AMD?



**24h購物**

**AMD Ryzen 7-3700X 3.6GHz八核心 中央處理器**

AMD Ryzen 7-3700X 3.6GHz八核心 中央處理器 amd r7-3700x 八核心處理器 cpu 核心數: 8 基本時脈速度: 3.6ghz  
最大渦輪核心速度: 4.4ghz

8核心 3.6G R7-3700X

網路價\$**9388**

1 ▾ 加入**24h購物車**

[加入追蹤](#)



**Intel Core i5-11400 中央處理器 盒裝**

Intel Core i5-11400 中央處理器 盒裝 ◆ 腳位: 1200 ◆ 時脈速度: 2.60-4.40 ghz ◆ 核心 執行緒: 6 12 ◆ tdp: 65 w

網路價\$**5688**

立即訂購

[加入追蹤](#)



**24h購物**

**Intel Core i5-10400F 中央處理器**

Intel Core i5-10400F 中央處理器 ◆ 腳位: 1200 ◆ 時脈速度: 2.90-4.30 ghz ◆ 核心 執行緒: 6 12 ◆ tdp: 65 w

網路價\$**5488**

1 ▾ 加入**24h購物車**

[加入追蹤](#)

# The meaning of Processor number - Intel Core i7

Intel® Core™ i7-11700F Processor (16M Cache, up to 4.90 GHz)

1.series(from low to high): Celeron / Pentium / i3 / i5 / i7 / i9

2.generation: i7-**11**700F

3.SKU(Stock Keeping Unit): i7-11**700**F. A higher SKU will generally have more features. SKU numbers are not recommended for comparison across different generations or product lines

4.suffix: i7-11700**F**. Suffix is used to indicate the feature of this processor. “F” stands for NO integrated graphics processors

# The meaning of Processor number - AMD R7

**AMD Ryzen™ 7 5700G**

- 1.series: Ryzen 7( or R7)
- 2.generation: Ryzen 7 **5**700G
- 3.SKU: Ryzen 7 **5700**G
- 4.suffix: Ryzen 7 5700**G**, “G” stands for having Radeon graphics cards

# CPU - series & generation



i7 > i5 > i3?

	i5-9600	i7-3820
First number(generation)	9	3
year	later	earlier
Performance	better !	not that good

should consider both series and generation

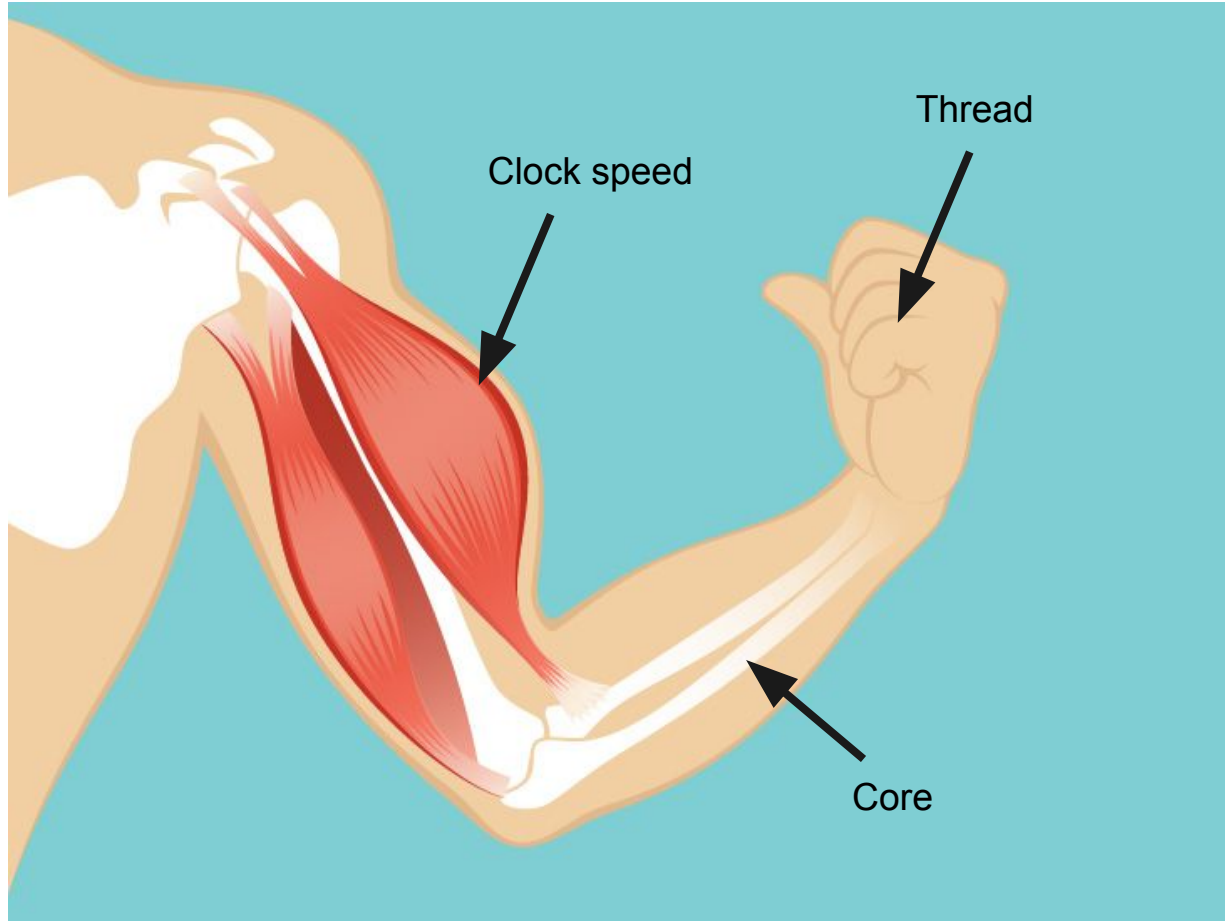




## Other factors

series and generation give you an overall evaluation of a CPU, but there are more details to take into consideration

- 1.Clock speed(時脈速度): Clock speed measures the number of cycles your CPU executes per second, measured in GHz (gigahertz).
- 2.Core number(核心數): The more core one processor has, the more tasks can be done at the same time.
- 3.Thread(執行緒): a core has more threads, it can do more complicated task.



# CISC vs. RISC



	Complex Instruction Set Computer (CISC)	Reduced Instruction Set Computer (RISC)
Instruction	complex	simple
Instruction length	long	short
Speed	slow	fast


$$A * B$$

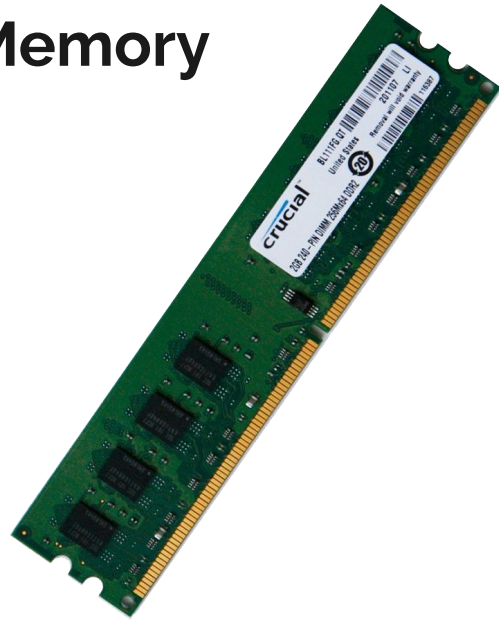
CISC instruction set :

Mult A, B

RISC instruction set :

LOAD R1, A  
LOAD R2, B  
PROD A, B  
STORE R3, A

# Memory



# Memory

Memory Specifications & parameters:

- Size: How much data can be stored
- Bandwidth: How many data can be processed at the same time
- Speed: How fast data can be processed at the same time



金士頓 Kingston FURY  
Beast 獸獵者 DDR5 5200

★為高效能而生★

網路價\$5758詳



Corsair 海盜船 Vengeance  
LPX DDR5 5600 32G

★升級就靠它!★

網路價\$6800詳



Corsair 海盜船 VENGEANCE  
NCE RGB PRO SL DDR4

◆不敗首選款◆

網路價\$3650詳



芝奇 G.SKILL Trident Z  
Royal Elite 皇家戟-尊爵

◆高品質嚴選IC◆

網路價\$7000詳

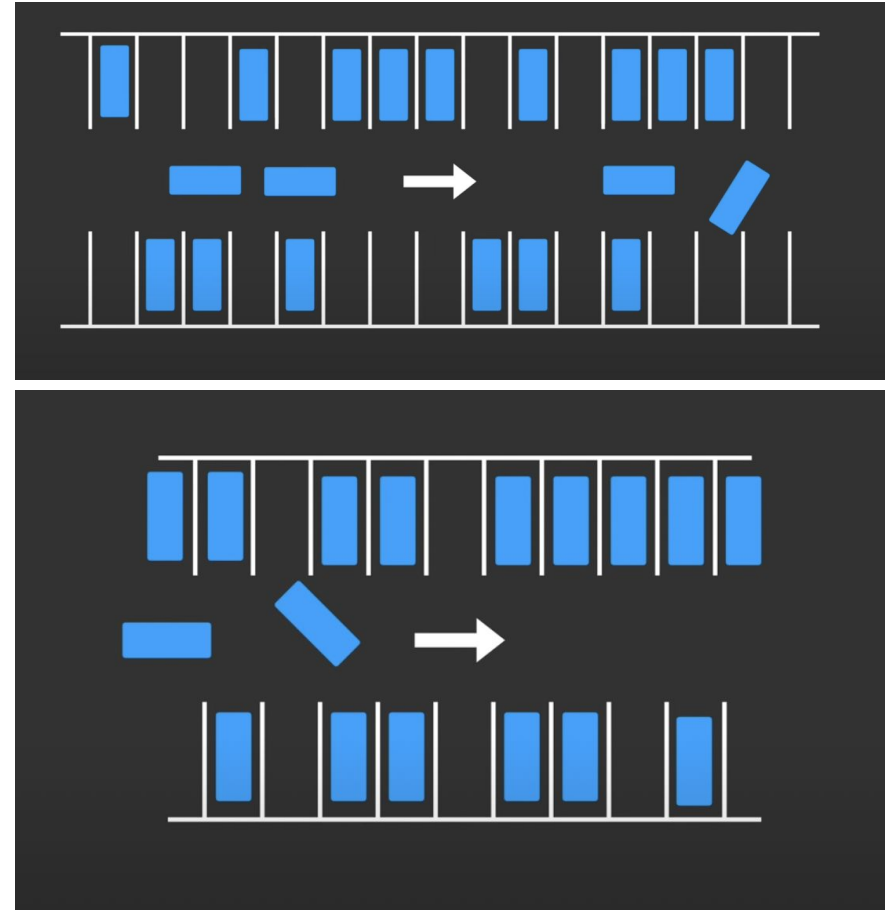


# Memory Size

Imaging a parking lot

More Size: More Space to park the cars

Less Size: Less Space to park the cars



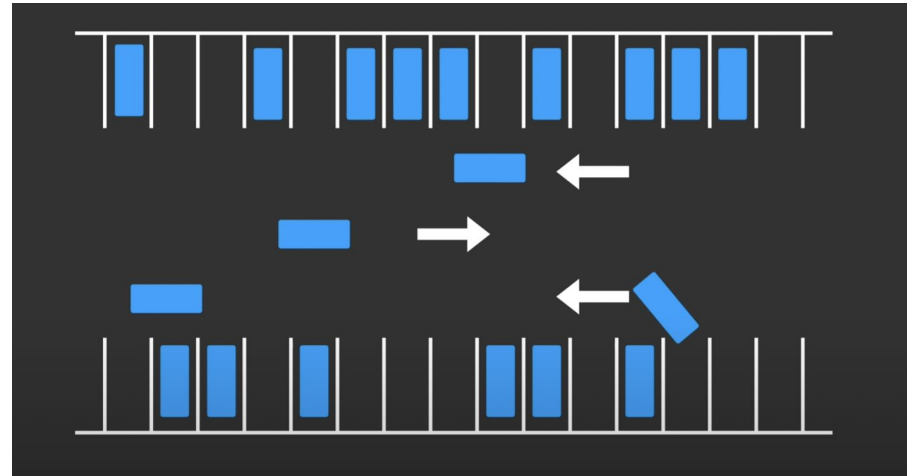
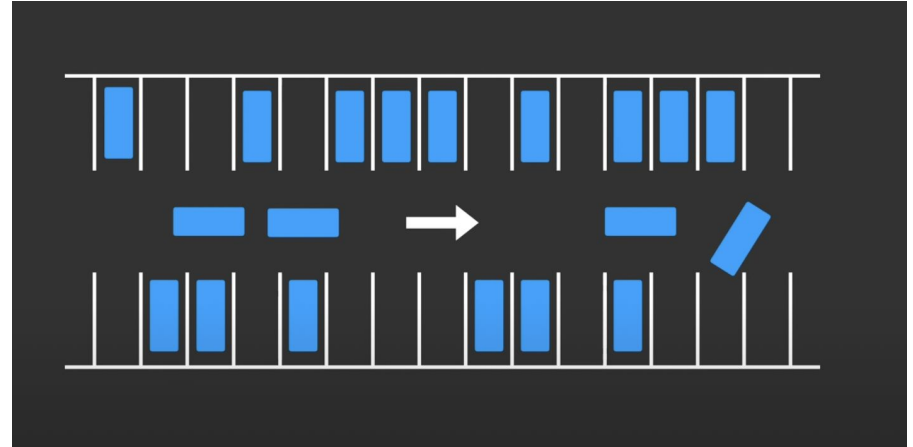


# Memory Bandwidth

Imaging a parking lot again

Single channel: only one car can move at the same time

Dual/Multi channel: two or more cars can move at the same time





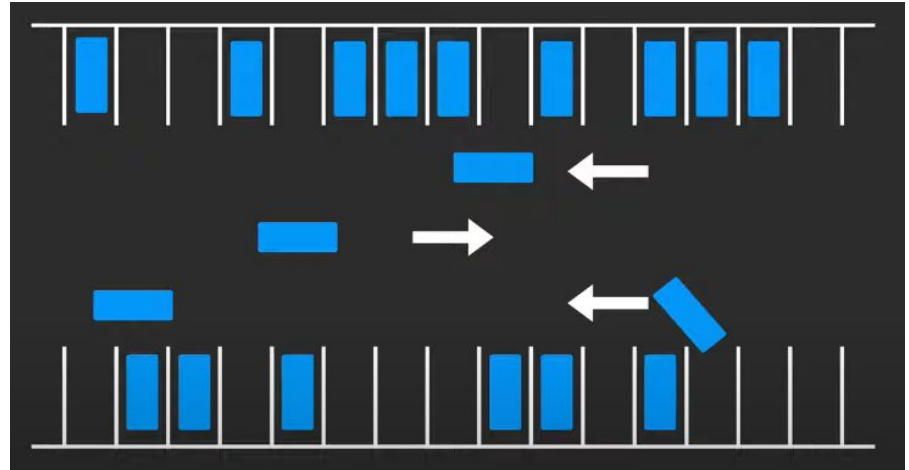
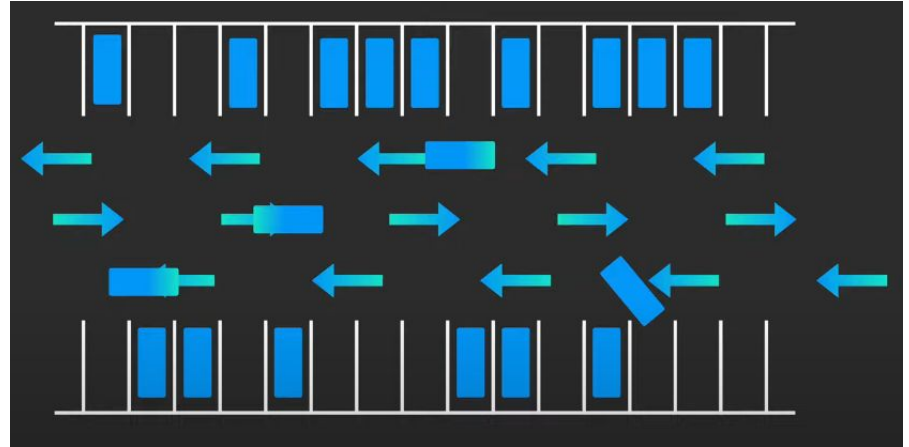


# Memory Speed

Imaging a parking lot again

Fast : The car's movement becomes faster

Slow : The car's movement becomes slower

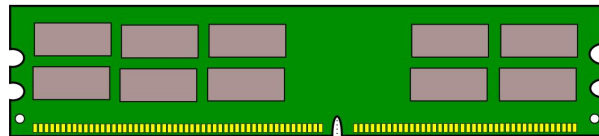


# Memory

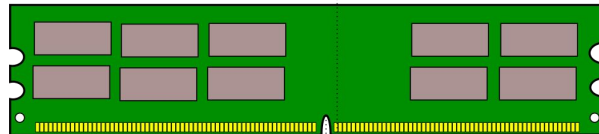
How to choose?

- DDR Generation (Double Data Rate)
- Frequency
- Size and Price

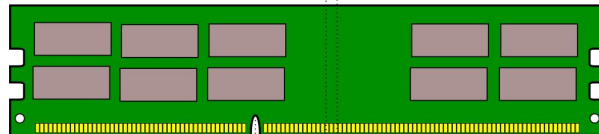
DDR



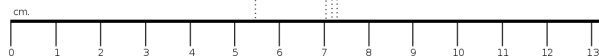
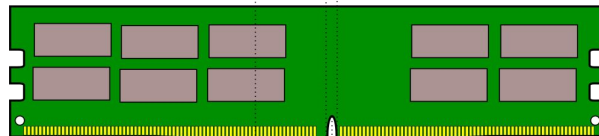
DDR 2



DDR 3



DDR 4



# Memory vs. Storage (Hard Disks)



	Memory	Storage
Size	less (in general 8~128GB)	more (in general 256GB~2TB)
Speed	very fast	slow
Price(per GB)	expensive	affordable
usage	temporary data	files that not used very often



## Trivia

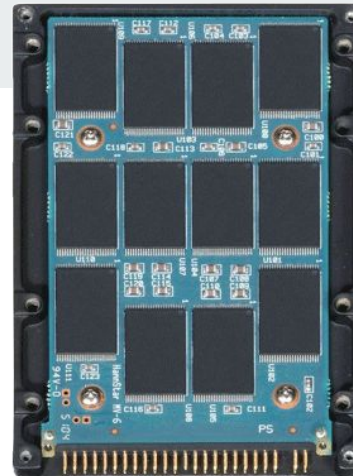
Do you know why our disk partition always starts from C(C:\)?

## Storage - Disk

- In the earlier time(<2000),  
A:\ and B:\ are for floppy disk usage
- Floppy disk  
capacity: small  
speed: slow



## HDD vs. SSD



	HDD (Hard Disk Drive)	SSD (Solid State Drive)
Full name	Hard Disk Drive	Solid State Drive
Mechanism	mechanical	electrical
speed	slower	faster
capacity	bigger (1TB ~ 8TB)	smaller (256GB - 2TB)
price	lower NT\$800 / 1TB	higher NT\$700 / 256GB



# GPU

1. what is GPU ?
2. CPU vs. GPU

# what is GPU?

To display gorgeous **3-D effects**, graphics card's computing power is increasing, so the concept of Graphics Processing Unit(GPU) came out





# CPU vs. GPU

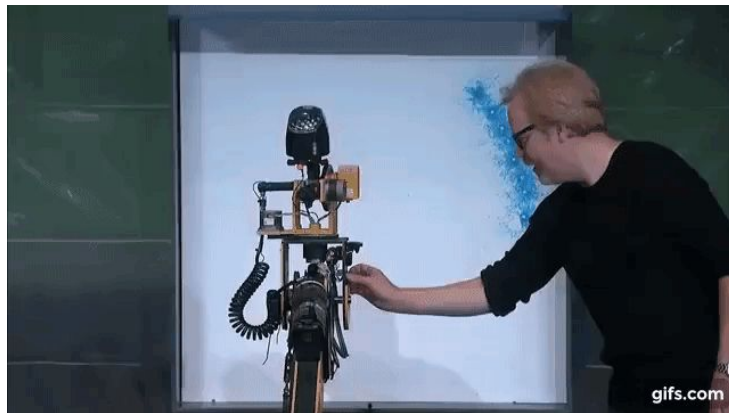
Same:

critical computing engines,  
**silicon-based** microprocessors, handling  
data

Different:

- CPU: **less core number**.  
Focuses on the **individual tasks** and get things done **one by one**.
- GPU: **more core number**.  
**Making lifelike visuals** is still the main function, become a  
general-purpose **parallel processor** in the same time.  
Tasks are **done in a parallel way**.

<https://www.youtube.com/watch?v=-P28LKWTzrl>



CPU

## CPU vs. GPU

GPU

**CPU的全名是什麼？ / What does CPU stand for?**

▲ Core Processing Unit

◆ Computer Processing Unit

● Central Processing Unit ✓

■ Control Processing Unit

# What are the two main components inside a CPU?

▲ RAM and ROM

● Cache and Register

◆ ALU and Control Unit ✓

■ GPU and APU

**According to the slides, when selecting a CPU, which of the following is correct?**

▲ **i7 is always better than i5 in performance**

◆ **A newer generation i5 might perform better than an older generation i7** ✓

● **Series is more important than generation**

■ **Smaller generation numbers are better**

**The characteristic of RISC architecture is "completing tasks through fewer complex instructions with high power."**



◆ 是

▲ 否





**Which of the following is NOT a main consideration when selecting memory?**

▲ Size

◆ DDR Generation

● SKU



■ Frequency (GHz)

# Which of the following is the true about the difference between CPU and GPU?

▲ CPU has more cores

◆ CPU is commonly used for gaming

● GPU excels at parallel processing ✓

■ CPU is much more expensive than GPU